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less area, it is shown more clearly that the marginal phenomena confirm Professor Chamberlin's previously published classification of the quaternary epochs. He recognizes (1) an earlier glacial epoch, in which two successive ice-sheets were separated by an interglacial period sufficiently marked to permit the growth of vegetation over the surface; (2) a prolonged interglacial epoch, during which the land was elevated to the extent of eight hundred to one thousand feet, and again forest-clad; (3) a later glacial epoch, during which the great terminal moraine was formed, while subordinate moraines and vegetal deposits testify to repeated recessions and advances of the ice; (4) the Champlain epoch, during which marine and lacustrine deposits were formed; (5) the terrace epoch, when the streams carved the flood-plains of the Champlain epoch into terraces.

The origin of the driftless area is found in the fact that the elevated land lying north-east of it must have acted as a wedge to divide the ice, while the diverging troughs of Lake Superior and Lake Michigan tended to prevent the streams from re-uniting immediately south of the obstruction. Climatic influences also probably played an important part in staying the progress of the ice which was advancing directly toward the driftless area. In the language of the authors, diverted by highlands, led away by valleys, consumed by wastage where weak, self-perpetuated where strong, the fingers of the *mer de glace* closed around the ancient Jardin of the Upper Mississippi valley, but failed to close upon it.

A History of Elizabethan Literature. By GEORGE SAINTSBURY.
New York, Macmillan. 12^o. \$1.75.

THIS book forms the second part of a general history of English literature from the earliest period to the present day. The whole work will be completed in four volumes, by four different writers, each specially qualified for his individual task. Mr. Saintsbury has been for many years an enthusiastic student of the period of which he treats, and he here gives the main results of his studies in a clear and well-ordered form. He wisely confines himself in the main to the purely literary aspects of his subject, with much less attention to biography and bibliography than some writers would give. He allows considerable space to the minor writers, a knowledge of whom he thinks essential to a correct understanding of the period. His enthusiasm for his subject is almost unbounded, and some readers will think it excessive. He styles the Elizabethan era "the greatest period in the greatest literature of the world," and seems too little aware of its defects. His admiration for Shakspeare is carried to the verge of idolatry, and he does not appear to see any faults at all in him.

Spenser he esteems almost as highly, and thinks the 'Faërie Queen' the greatest poem in the English language. With regard to the forms of poetry, he maintains that "every English metre since Chaucer at least can be scanned, within the proper limits, according to the strictest rules of classical prosody," — an opinion with which very few persons will agree. The greater part of the book is of course devoted to the writers of verse, yet the prose writers are treated with sufficient fulness. Bacon, in Mr. Saintsbury's opinion, was more of a rhetorician than a philosopher, and might better have gone into the Church than into politics. Hobbes is spoken of as the first prose writer whose style is clear and uninvolved; while the general style of the period is well characterized in the remark, that at that time "the sense of proportion and order in prose composition was not born." Mr. Saintsbury's work, notwithstanding some defects, will be valuable both to the student and to the general reader; and, if the other volumes of the series are equally well done, the whole work will be the standard history of English literature.

Hegel's Philosophy of the State and of History. By GEORGE S. MORRIS. Chicago, Griggs & Co. 16^o.

THIS book is the sixth in the series of philosophical classics now in course of publication under the editorial supervision of Professor Morris. It gives in a brief, by no means superficial form the theories of Hegel on the constitution of the state and of civil society, and also on the philosophy of history. Hegel's terminology is so strange to the English reader, and his processes of thought often so obscure, that it is not an easy task to make his meaning plain and comprehensible, but Professor Morris has succeeded in doing this as well

as could be expected. The theory of the state which the German philosopher has given is not in all respects such as the people of a free country are likely to accept. He repudiates the intention of describing an ideal state, such as Plato and others have dreamed of, and he has little respect, apparently, for such attempts on the part of others; yet it is not difficult to see that a constitutional monarchy is in his eyes, if not an ideal state, at least the most perfect type that has yet been devised. He divides the powers of government into three classes, — the legislative power, the executive power, and the power of ultimate decision, which properly resides in the monarch alone. He is strongly in favor of a representative assembly to take part in legislation, but he regards with great distrust the influence of public opinion, which is the inevitable consequence of representation. On the subject of war, Hegel is not in accord with the peacemakers, his view being that "war is to nations what wind is to the sea, — it preserves them from stagnation and putrescence."

On the subject of history the views of Hegel are in some respects a little behind the age, owing partly to the new theories of development which now prevail, and partly to the discovery and interpretation since his time of the ancient records of Egypt and Assyria. Still his theories are well worth pondering. He holds that history as a whole is "the development of the conception of freedom," — a remark that seems to apply rather too exclusively to mere political history. He passes in review the history of the leading nations, briefly characterizing the civilization of each, and showing the connection of them all with the life of modern Europe. In the course of this exposition he has many interesting observations on special points which we should be glad to quote if space permitted, but we must content ourselves with recommending our readers to look them out for themselves.

NOTES AND NEWS.

IN compliance with what seems to be a wide-spread desire on the part of the geologists of America, a few have united in an effort to establish an American journal devoted to geology and its allied sciences. The subscription price is three dollars per year, and the place of issue for the present is Minneapolis, Minn., where correspondence should be addressed to *The American Geologist*. From all geologists the editors solicit original contributions and items of scientific news. The editors and publishers, for the year beginning Jan. 1, 1888, are as follows: Prof. S. Calvin, Iowa City, Io.; Prof. E. W. Claypole, Akron, O.; Dr. Persifor Frazer, Philadelphia, Penn.; Prof. L. E. Hicks, Lincoln, Neb.; Mr. E. O. Ulrich, Newport, Ky.; Dr. A. Winchell, Ann Arbor, Mich.; Prof. N. H. Winchell, Minneapolis, Minn.

— A company has been incorporated for building a railroad from Winnipeg to Fort Simpson, British Columbia, crossing the Rocky Mountains by way of the Peace River Pass. This is one of the routes surveyed by the Canadian Pacific Railroad. It was recommended, as the distance from Fort Simpson to eastern Asia is still shorter than that from Vancouver. Part of the country through which this road would pass is suitable for agricultural purposes. The charter compels the incorporation to build at least fifty miles each year, the whole distance being a little more than sixteen hundred miles.

— The second number of the bibliographies of Indian languages by James C. Pilling has just been issued by the Bureau of Ethnology. It treats of the Siouan stock. The plan of this bibliography is the same as the one followed in the 'Bibliography of the Eskimo Language,' which was referred to in No. 235 of *Science*. The dictionary plan has been followed to its extreme limit, the subject and tribal indexes, references to libraries, etc., being included in one alphabetic series. The arrangement is excellent, and makes the bibliography very handy for use.

— The Pennsylvania State College Agricultural Experiment Station was established by vote of the trustees June 30, 1887, in accordance with the provisions of the Hatch act, and will continue and greatly enlarge the experimental work of past years. It investigates such subjects as are of immediate importance to the farmer of the State, and publishes the results in reports and bulletins, which are distrib-

uted free of charge to all citizens of the State who apply for them. Specimens of agricultural products, when of public interest, are examined and reported upon free of charge. The board of directors is as follows : H. P. Armsby, Ph.D., director; William Frear, Ph.D., vice-director and chemist; William A. Buckhout, M.S., botanist; George C. Butz, B.S., horticulturist; William C. Patterson, superintendent of farm. Correspondence is invited, and inquiries upon agricultural matters will be answered as far as possible. Address Agricultural Experiment Station, State College, Centre County, Penn.

— We learn from *Nature* that in a Russian paper of Oct. 22 last, appears a preliminary report of the examination by Latschinof and Jeroefief, professors of mineralogy and chemistry respectively, of a meteoric stone weighing four pounds, which fell in the district of Krasnoslobodsk, Government of Pensa, Russia, on Sept. 4, 1886. In the insoluble residue, small corpuscles showing traces of polarization were observed. They are harder than corundum, and have the density and other characters of the diamond. The corpuscles are said to amount to one per cent of the meteoric stone. Carbon, in its amorphous graphitic form, has been long known as a constituent of meteoric irons and stones. Lately, small but well-defined crystals of graphitic carbon, having forms often presented by the diamond, were described as having been found in a meteoric iron from western Australia. If this supplementary discovery be confirmed, we may at last be placed on the track of the artificial production of the precious stone.

— The loss of electricity by a conductor in moist air, says *Nature*, has been lately studied by Signor Guglielmo (Turin Academy). He finds that with potentials less than 600 volts, moist air insulates as well as dry air, but with higher potentials there is more loss in moist air, and more the moister the air and the higher the potential. The potential at which the difference becomes perceptible is the same for a ball as for a fine point. It occurs with extremely smooth surfaces, and so cannot be attributed to discharges in consequence of roughness of surface. With equal potential, the loss of electricity has the same magnitude, whatever the dimensions of the balls used as conductors. In air saturated with vapors of insulating substances, the loss of electricity of a conductor is nearly the same as in dry air.

— According to *Nature*, frozen fish are now imported into France, and a society formed in Marseilles for the purpose of developing the trade (the Société du Trident) has a steamer and a sailing-vessel engaged in it. The steamer 'Rokelle' lately came into Marseilles with some 30,000 kilograms of frozen fish in its hold, the temperature of which is kept at 17° C. below zero by means of a Pictet machine (evaporating sulphurous acid). The fish are caught with the net in various parts of the Mediterranean and Atlantic. After arrival they are despatched by night in a cold chamber. Experiment has shown that fish can be kept seven or eight months at low temperature without the least alteration. These fish are wrapped in straw or marine algæ, and have been sent on to Paris, and even to Switzerland.

— We learn from *Nature* that the fourth session of the International Geological Congress will be held next year in London. The congress was founded at a meeting of the American Association for the Advancement of Science, at Buffalo, in 1876, the first session being held at Paris in 1878, the second at Bologna in 1881, the third at Berlin in 1885. The following is a list of the organizing committee appointed to carry out the arrangements : H. Bauer- man; W. T. Blanford, F.R.S.; Rev. Prof. T. G. Bonney, F.R.S.; Prof. W. Boyd Dawkins, F.R.S.; John Evans, F.R.S.; Prof. W. H. Flower, F.R.S.; Arch. Geikie, F.R.S.; Prof. James Geikie, F.R.S.; Sir Douglas Galton, F.R.S.; Prof. A. H. Green, F.R.S.; Rev. Prof. S. Haughton, F.R.S.; Prof. T. H. Huxley, F.R.S.; W. H. Hudleston, F.R.S.; Prof. T. McK. Hughes; J. W. Hulke, F.R.S.; Prof. E. Hull, F.R.S.; Prof. J. W. Judd, F.R.S.; Prof. J. Prestwich, F.R.S.; F. W. Rudler; H. C. Sorby, F.R.S.; Sir W. W. Smyth, F.R.S.; W. Topley; Rev. Prof. Wiltshire; Henry Woodward, F.R.S. The duty of this committee will be to nominate the officers, to appoint executive committees, and to fix the exact date of meeting. The congress at Berlin requested that the meeting should be held in London between Aug. 15 and Sept. 15.

— The theory is advanced by Professor Mendeleef that petroleum is of mineral origin, and that its production is going on, and may continue almost indefinitely. *Engineering* states that he has succeeded in making it artificially by a process similar to that which he believes is going on in the earth, and experts find it impossible to distinguish between the natural and the manufactured article. His hypothesis is that water finds its way below the crust of the earth, and then meets with carbides of metals, particularly of iron, in a glowing state. The water is decomposed into its constituent gases ; the oxygen unites with the iron, while the hydrogen takes up the carbon, and ascends to a higher region, where part of it is condensed into mineral oil, and part remains as natural gas, to escape where it can find an outlet, or to remain stored at great pressure until a bore-hole is put down to provide it a passage to the surface. Oil-bearing strata occur in the vicinity of mountain ranges, and it is supposed that the upheaval of the hills has dislocated the strata below sufficiently to give the water access to depths from which it is ordinarily shut out. If the centre of the earth contains large amounts of metallic carbides, we have in prospect a store of fuel against the days when our coal will be exhausted.

— In 'Notice to Mariners,' No. 94, published by the United States Coast Survey, some very interesting information is given regarding the Gulf Stream. Between Rebecca Shoal and Cuba the current was found to vary in velocity, the maximum velocity arriving about nine hours and twenty minutes before the transit of the moon, and between Cuba and Yucatan the greatest velocity was found at ten hours before the moon's transit. The greatest velocity of the current was observed fifty-one miles south of Rebecca Shoal, at which point the stream moved 3.73 knots per hour. Between Yucatan and Cuba the stream's greatest velocity was 6.32 knots, about thirty miles from Yucatan toward Cape San Antonio.

— The United States Coast Survey Steamer 'Blake,' Lieut. J. E. Pillsbury commanding, will continue the investigation of the Gulf Stream currents during the coming winter and spring months at the places mentioned below ; and shipmasters, when in the vicinity, are requested to look out for and keep clear of her. During January and the first part of February the 'Blake' will be anchored about six hundred miles north-east of Barbadoes Islands, and in the track of vessels bound to the United States from the South Atlantic or off the South American coast to the eastward of Trinidad Island ; the last part of February and until May, between the West India Islands, commencing at Trinidad, and ending at the old Bahama channel. When at anchor, she will hoist three balls from the fore-topmast stay, and at night-time she will show from the same point three lights, — red, white, and red.

LETTERS TO THE EDITOR.

* * Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith. Twenty copies of the number containing his communication will be furnished free to any correspondent on request. The editor will be glad to publish any queries consonant with the character of the journal.

Conspiracy of Silence.

I THINK your correspondent (Dec. 16, p. 298) is unjust to Professor Bonney, placing a meaning on his words which they will indeed bear, but which was not Professor Bonney's meaning. I am not a Darwinist, and have never accepted the Darwinian hypothesis so called ; and I can therefore dispassionately defend Professor Bonney. But I should like to volunteer a rather unnecessary defence of men of science as a class, whether Darwinists or anti-Darwinists, whom your correspondent attacks indiscriminately. 'Conspiracy' is an ugly word ; and it is, as both Professor Huxley and Professor Bonney assert with good reason, not only an ugly word, but an improbable thing ; and not only improbable, but (as the scientific world is now constituted) impossible in a large way. A conspiracy within the limits of one scientific institution, to suppress a paper, may be planned and executed with some success by one or more of its officers and one or more of its members opposed to the writer of that paper. Thus far, but no farther, can a scientific conspiracy go. The thing has been often done, and will be often done ; but it is a foolish thing to do, perfectly futile, injurious to the society in which it happens, and in the end injurious to the conspirators. But the writer of a paper, if it be a good one, can find many other ways of publishing it, without encountering a con-